TECHNICAL INFORMATION

GP2020 TRAFFIC MODEL

Traffic model forecasts provided a key basis for developing the GP2020 Proposed CE Road Network. The GP2020 traffic model is composed of three primary parts: (1) the San Diego Association of Governments' (SANDAG) Series 10 Transportation Model, (2) the County's roadway network, and (3) the County's land use scenarios — August 2006 Draft Land Use and June 2005 Board Alternative Maps. The County's Department of Public Works (DPW) assisted SANDAG in providing data for the model's roadway network, while the Department of Planning and Land Use (DPLU) supplied SANDAG with existing and projected land use data.

Methodology

The SANDAG Series 10 Regional Forecast model is used by SANDAG to forecast transportation impacts in San Diego County through the year 2030. Because the SANDAG Regional Forecast Model provides traffic projections for the CE road networks for all jurisdictions in the San Diego region, it serves as an appropriate basis for the GP2020 traffic model. The Series 10 model, which was customized and calibrated for GP2020, also incorporates trips that come in and out of the San Diego region from Riverside, Orange and Imperial counties as well as Mexico.

The 2030 forecast was used for the GP2020 road network planning to be consistent with the Series 10 model, SANDAG's Regional Transportation Plan (RTP), and planning efforts in the incorporated jurisdictions. The 2030 forecast is also appropriate because the projected buildout population in the unincorporated county is generally consistent with SANDAG's 2030 population forecast.

Traffic Model Calibration

Using year 2000 as a baseline, the goal of the model calibration process is for model forecasts of estimated daily vehicle trips to be as close as possible to actual counts when run for an existing land use scenario. Through an iterative process, actual traffic counts of daily vehicle trips were measured against the model's estimated counts using the same road network and land use scenario. When large differences occurred between actual counts and estimated trips, adjustments were made to the functionality of the road network, such as travel speed, intersection improvements, or vehicle trip loading onto the network.

To measure the level of balance between the model's forecast of daily vehicle trips and actual counts; numerous cross-region roads were selected for a use as screen-line crossing checks. Screen-lines can be used to evaluate traffic model accuracy. A screen-line totals up traffic counts and estimated traffic volumes along an imaginary line cutting across a number of facilities. Based on professional experience, SANDAG guidelines, and industry standards, a 15 percent difference between actual and estimated trips is considered an acceptable level of accuracy for screen-line crossing checks of County CE roads. The GP2020 calibration efforts

achieved a difference for the screen-line crossing check roads of between -4 percent and 14 percent.

Land Use Scenarios

The August 2006 Draft Land Use Map is the land use scenario used to model the Proposed CE Road Network. This scenario is a result of land use modifications made to the June 2005 Draft Land Use Map in an effort to balance the road network and land use during the planning process. In addition, the June 2005 Board Alternative Map is a second land use scenario. Each land use scenario was analyzed at its full plan capacity and then adjusted by potential building constraints that could impact yield.

Roadway Network

The GP2020 traffic model for state highways/freeways located in the county was based on Series 10 forecasts for the year 2030 using a "reasonably expected revenues" set of assumptions that were identified in the SANDAG 2030 RTP. These assumptions provided a realistic estimate of the future road improvements that would be constructed. The resulting roadway network established a baseline upon which operations without additional improvements could be estimated and future road improvement needs could be identified. The CE road network for incorporated jurisdictions is based on their adopted Circulation Elements. The network of city roads, state highways and freeways remained constant, while the county road network was modified through an iterative planning process to resolve road capacity deficiencies identified by the GP2020 traffic model.

After calibration, the first GP2020 traffic model forecast was based on the Existing/CIP county road network for the June 2005 Draft Land Use Map. This network is comprised of existing roads in the unincorporated county; along with currently (2005) scheduled and funded Capital Improvement Plan (CIP) projects. Traffic models run using this network identified deficiencies in the existing road network that would result from buildout of GP2020 land use plans.

Using deficiencies identified in the Existing/CIP network as a baseline, staff worked with community planning groups to identify road network alternatives that would resolve the capacity deficiencies. After a twelve-month public outreach process, three network alternatives were identified for the GP2020 traffic model using the June 2005 Draft Land Use Map land use scenario. The traffic model forecasts for these alternatives are provided in Appendix D. The deficiencies identified by the traffic model for these alternatives, along, with community input, provided the basis for the initial staff recommended network. Approximately five additional model forecasts were conducted, along with land use modifications to refine the staff recommended network.

The result is the Proposed CE Road Network for the August 2006 Draft Land Use Map. The GP2020 model was also used to conduct traffic forecasts for the Proposed CE Road Network with the June 2005 Board Alternative Map. The capacity deficiencies identified were used as basis to identify a Board Map Road Network. Both the Proposed CE Road Network and the Board Map Road Network are presented in Appendices A and B.

Traffic Modeling Results

Traffic volumes on the County's CE roads were calculated as the number of average daily trips (ADT) that pass through a particular road segment within a 24-hour period. County roadway design standards provided the basis for the level of service calculations. State standards were used to evaluate traffic volumes on state highways and freeways, and those standards focus on the morning and afternoon peak hour periods.

Traffic model results are described in terms of Level of Service (LOS), which measures the quality of operating conditions on our roadways. Criteria include speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. These criteria are used to determine a road's capacity. When traffic volumes approach or exceed capacity, the road operates at an unacceptable LOS evidenced by stop-and-go traffic, added congestion and delays, or even gridlock during peak traffic periods. Traffic volume information was compared to the capacity of each road segment to determine whether the road would operate at an acceptable LOS. The various LOS categories are defined via the County's Public Road Standards. Table G-1 provides definitions for level of service that applies to peak traffic periods on State highways and freeways.

Table G-1: Freeway Segment Level of Service Definitions

LOS	Volume to Capacity Ratio	Congestion / Delay	Traffic Description
A	≤0.41	None	Free flow
B	0.42-0.62	None	Free to stable flow, light to moderate volumes
C	0.63-0.80	None to minimal	Stable flow, moderate volumes, freedom to maneuver noticeably restricted
D	0.81-0.92	Minimal to substantial	Approaches unstable flow, maneuverability and psychological comfort extremely poor.
E	0.93-1.00	Significant	Extremely unstable flow, maneuverability and psychological comfort extremely poor.
F	>1.00	Considerable; 0-1+ hour delay	Forced flow, heavy congestion, long queues form behind breakdown points, stop and go.

Source: 2000 Highway Capacity Manual; Wilson and Company, February 2005

As part of the GP2020 update, staff recommends the Board endorse levels A through D as acceptable. Therefore, only road segments that operated at LOS E or F were evaluated further during the planning process. A road's LOS can be improved by increasing the number of lanes, adding operational improvements such as a raised median and turn lanes, building a new road, and modifying land uses to reduce the intensity of development.

Although computer modeling represents the best technique currently available, the end result is only a projection based upon the various inputs provided. The traffic model represents a very complex process and deals with a large amount of data. Often even a minor change can result in a slightly different outcome. Consequently, traffic modeling was not the sole criteria used during road network planning.

Traffic Model Assumptions

A 2030 forecast served as the basis for GP2020 road network planning. The 2030 forecast was considered more appropriate than the 2020 forecast. These GP2020 population projections are generally consistent with SANDAG's 2030 population forecasts. The SANDAG RTP and other regional studies all use a 2030 forecast year. Most improvements to State road facilities located within the unincorporated area would not be constructed until after 2020; therefore, using a 2020 forecast would not include these improvements. Fewer improvements on State facilities will require greater improvements to balance the County road network.

External Trip Estimates

The Series 10 model assumes average daily external trips to/from Orange, Riverside and Imperial counties, as well as Mexico. Those external trip estimates in average daily trips (ADTs) are used for the GP2020 model. External trips from Riverside County have the greatest direct impact on roads in the unincorporated County. This is exacerbated by the significant increase in trips between Base Year 2000 (95,700 ADTs) and the 2030 forecast (246,000 ADTs). 2030 forecast is based countywide 2030 population projections and buildout of land use plans for all jurisdictions in San Diego County, as compared to the number of projected number of jobs in the county. The imbalance in jobs to housing in San Diego County — where there are more jobs than potential residential units as allocated by each jurisdictions general plan, has resulted in an increased percentage of persons working in San Diego County while living in Riverside County. Most commute to work from Riverside County on the I-15. This new estimate is based on updated traffic counts, U.S. Census data, and preliminary Series 11 Traffic Model commute forecasts. Prior to SANDAG's updated estimate, the GP2020 model used the Caltrans District 8 cordon value of 250K, but the Proposed CE Road Network model results are based on the revised SANDAG estimate of 246K.

Land Use

The larger, more general Series 10 regional Traffic Analysis Zones (TAZs) were subdivided into smaller units/zones in the unincorporated area in order to enhance the accuracy and validity of the traffic forecast analysis. Traffic projections are determined by first analyzing the number of vehicular trips that would be generated by existing and proposed land uses (trip generation) and their likely distribution of traffic. For residential areas, trip generation is based on the number of ADTs per dwelling unit as follows: (1) single family – 8.2 ADTs/unit; (2) multifamily – 5.7 ADTs/unit.

Non-residential trip generation rates are based on SANDAG Series 10 regional trip rate factors, which vary according to the type of land use and have been compiled from regional surveys. The trip generation factors were modified in areas outside the County Water Authority boundary to take into account the less intensive development patterns in rural areas. Standard SANDAG trip generation rates are assigned to existing facilities, utilizing the latest land use information available for the unincorporated County. The GP2020 land use designation overrides the existing land use when the site is currently undeveloped or in agricultural use, or when GP2020 proposes a more intensive use than existing. Projected development on vacant lands was based on land use designations from each of the land use scenarios. The primary SANDAG trip generation rates used for the GP2020 model are shown in table G-2.

Table G-2: GP2020 Traffic Model: Land Use Designation Cross Reference

GP2020 Designation	SANDAG Category	ADTs/ Acre	Assumptions
(C-1) General Commercial	5003 — Community Commercial	694.1	Acreage is reduced by 50 percent outside the CWA to account for land / infrastructure constraints, with the exception of Tecate where property owner proposals assume urban-scale land uses to serve residents of Tecate, Mexico.
(C-2) Office Professional	6002 — Low Rise Office	221.4	Same as above
(C-3) Neighborhood Commercial	5004 — Neighborhood Commercial	1,089.5	Same as above
(C-4) Rural Commercial	N/A	250.0	Same as above
	1503 — Resort	101.3	Borrego Springs only – Acreage reduced by 50 percent to account for land / infrastructure constraints
(C-5) Village Core Mixed Use	N/A		Designation not used — for traffic modeling. Areas are sub-divided into standard GP2020 land use designations.
(I-1) Limited Impact Industrial	2101 — Industrial Park	178.0	Acreage is reduced by 50 percent outside CWA similar to General Commercial above.
(I-2) Medium Impact Industrial	2103 — Light Industry	102.2	Same as above
(I-3) High Impact Industrial	2001 — Heavy Industry	51.0	Same as above
Specific Plan Area	N/A		Assumes the density of the built, approved, or proposed project.
Public/Semi-Public Facilities	6109 — Other Public Service	268.5	In nearly all situations trip generation rates are based on the existing land uses. Rate would apply only to undeveloped parcels.
National Forest/ State Parks	7602 — Passive Park	0.0	Trip rates are based on existing land use.
Military Facilities		0.0	Trip rates are based on existing land use.
Tribal Lands	7603 — Open Space	0.0	Applied to tribal lands without casinos and supporting facilities only.
Open Space (Recreation)	7601 — Active Park	50.2	
Open Space (Conservation)	7603 — Open Space	0.0	

Specific land use assumptions used in the model are identified below:

- *Unincorporated Area*: Buildout of land use scenarios as predicted by DPLU population model without regional controls, which also included buildout of Tentative Maps (TM) and Tentative Parcel Maps (TPM) permit applications submitted to DPLU prior to August 6,

2003, even when projects were inconsistent with GP2020. However, GP2020 forecasts do not include General Plan Amendments, which will be evaluated in the GP2020 EIR.

Trip generation rates based on SANDAG regional trip rate factors and GP2020 Land Use designations were assigned a corresponding SANDAG Land Use code, with the following exceptions:

a. Actual enrollment data was used for schools and community colleges

b. Standard rates for police and fire stations were adjusted downward to more accurately reflect the actual size of facilities in more rural areas

- *Incorporated Areas*: Levels of development by the year 2030 as predicted by SANDAG 2030 Series 10 forecast model without the use of regional control totals.

- *Tribal Lands*: Buildout of known or currently proposed expansions plans (as of May 2006) for tribal gaming facilities based on trip generation rates developed through negotiations between tribal governments and the State/County through the negotiations of cooperative agreements.

- *Areas outside San Diego County*: Year 2030 levels of trip attractions/productions based on SANDAG Series 10 forecasts for Riverside, Orange, and Imperial Counties and Mexico.

Road Network

With one exception, the traffic model forecasts assume buildout of improvements to the regional transportation systems of freeways, transit systems, and state highways as planned in the SANDAG 2030 Regional Transportation Plan (RTP) under the Reasonably Expected Revenue (RER) Scenario.

The 2030 RTP RER includes widening of the I-15 to 12 lanes from SR 163 to SR 78. In addition the SCAG RTP plans to widen the I-15 to twelve lanes north of the Riverside County boundary, but the I-15 from SR 78 to Riverside County line would remain eight lanes. Using build-out of this scenario, traffic forecasts for 2030 resulted in unreasonable traffic congestion on county roads parallel to I-15 along this segment. When an eight-lane I-15, combined with the SANDAG estimate for the Riverside cordon volume (279K) were modeled, the forecast volume of ADTs increased dramatically on roads offering parallel route to the I-15, particularly Old Highway 395 and Rainbow Valley Boulevard. Also, high traffic volumes resulted in unmitigable and unacceptable levels of congestion on SR 76. Since the purpose of the county road network is not to supplement unresolved congestion on the freeway system, the GP2020 Proposed CE Road Network assumes widening the I-15 to 12 lanes from SR 78 to Riverside County. Additional road network assumptions are identified below:

- Incorporated Area
  - *City Roads:* SANDAG Series 10 roadway network reflecting revenue constrained improvements through the year 2030.

  - *State Roads:* SANDAG Series 10 roadway network reflecting reasonably expected revenue improvements through the year 2030, with the exception of the I-15 between SR 78 and Riverside County, as discussed above.

- State Roadway Definitions

  - *State highways:* State roadways with at grade intersections.

  - *State freeways*: State roadways that are fully access controlled with interchanges.

- Level of Service (LOS) and corresponding capacities:

  - *County CE roads:* As defined in the Proposed GP2020 Public Road Standards (see Appendix E). LOS is based upon daily 24-hour conditions.

  - *State facilities*: Based upon peak hour/peak direction traffic volumes and relationship to assumed peak hour capacities. The resulting volume to capacity relationship (V/C ratio) is used to determine the LOS.

- Road Improvement Costs:

  - *County CE roadways:* The cost to construct the proposed network is based on the increase in lane miles and medians of the Proposed CE Road Network from the existing plus CIP network.

  - *State highways and freeways:* The GP2020 traffic model included State facilities that are forecast to be constructed through 2030 as identified in the SANDAG 2030 RTP. Additional improvements to these facilities that are part of the proposed GP2020 network are identified in the Caltrans Issues section as non-programmed Caltrans improvements.

CALTRANS ISSUES

The proposed County road network was developed based on a key assumption – build-out of improvements to the regional transportation systems of freeways, transit systems, and state highways as planned in the SANDAG 2030 Regional Transportation Plan (RTP) under the Reasonably Expected Revenue (RER) Scenario. Any improvements to non-county roads included in the GP2020 Proposed CE Road Network, but not included in the SANDAG 2030 RTP RER are considered non-programmed Caltrans improvements. These improvements are reported under three categories of improvements: (1) additional freeway/State highway lanes; (2) interchange improvements; and (3) unresolved congestion resulting in a LOS E/F on State highways and freeways.

Road Improvements Not Programmed in the 2030 RTP

Road Widening

The GP2020 Proposed CE Road Network assumes that the Interstate-15 would be widened from eight to twelve lanes from State Route 78 to the Riverside County boundary (20 lane miles), but these improvements are not programmed in the SANDAG 2030 RTP RER scenario. The cost to widen these roads is estimated to be $1.2 billion dollars. In addition, the Proposed CE Road

Network would widen the State highways identified in Table G-3. The costs to widen these roads are reported in Appendix H.

Table G-3: Proposed Widening of State Facilities

Community	Improvement
Bonsall	State Route 76: Widen to six lanes (Melrose Drive to Mission Road)
Fallbrook/Pala-Pauma	State Route 76: Widen to four lanes (I-15 to Couser Canyon Road)
North County Metro	San Pasqual Valley Road (SR 78): Widen from two to four lanes with median (Oak Hill Drive [Escondido] to Cloverdale Road)
Jamul	State Route 94: Widen to four lanes (Steele Canyon to Lyons Valley Road)
Lakeside	State Route 67: Widen from four to six lanes (just north of Willow Road to Scripps Poway Parkway)
Ramona	State Route 67: Widen from two to four lanes (Dye Street to Pala Street)
	State Route 78 (Pine Street): Widen from two to four lanes (Ash Street to Main Street)
Valle de Oro	SR 94: Widen from four to six lanes (Jamacha Road and Existing CE Alignment)
Tecate	SR-188: Widen from two to four lanes (International border to SR 94)
Board Map Only:	
Jamul / Mountain Empire	SR-94: Widen to four lanes (Melody Road to Harris Ranch Road)

In addition to adding lanes, other improvements are proposed to State facilities to resolve failing level of service. This includes the addition of medians, turn lanes, or passing lanes. These improvements have been proposed for State facilities SR 67, SR 76, SR 78, and SR 94.

Interchange Improvements

New or improved interchanges were assumed when they resolved high levels of congestion on county roads without widening these roads. New or improved interchanges are proposed for Alpine, Lakeside, Otay, and Valle de Oro. Table H-6 in Attachment H identifies the estimated cost for interchange improvements that are not included in the SANDAG 2030 RTP RER scenario

In many instances, operational improvements to interchanges would result in LOS improvements for the road they serve. More detailed study is required to determine the scope of these improvements, which primarily consist of widening on/off ramps or adding turn lanes. Operational improvements are required to the following interchanges:

- Alpine (I-8 at Tavern Road) — Add a eastbound off-ramp lane

- Sweetwater (I-805 at Bonita Road) — Add a northbound onramp lane

Despite the above improvements to State facilities, approximately 276 miles of freeway and 50 miles of State highway lane miles are forecast to operate at an unacceptable LOS with build-out of GP2020 August 2006 Draft Land Use Map and the Proposed CE Road Network. Table G-5

below identifies the State highways and freeways forecast to operate at a failing LOS in the GP2020 traffic model.

Table G-4: State Facilities Operating at LOS E/F in 2030

State Facility	Segment	LOS
I-8	Los Coches Road to Tavern Road (Lakeside, Alpine)	E
I-15	Riverside County Boundary to City of Escondido (Rainbow, Fallbrook, Bonsall)	E/F
SR-76	City of Vista boundary to Gird Rd.	E/F
SR-78	Warnock Road to Gunn Stage Road (Ramona)	E
	Rancho Santa Fe Road west to City of San Marcos	E
SR-94	Melody Road to Honey Springs Road (Jamul)	E

POTENTIAL CASINO TRAFFIC

Trip generation for tribal gaming facilities in the GP2020 model is based on information for proposed casinos or expansion plans for existing facilities contained in Environmental Assessments/Evaluations received by DPLU for review. The GP2020 traffic model does not address future unknown expansion plans of tribal gaming facilities through 2030, which are considered to be speculative at this time.

Caltrans staff is currently in the process of using the State Compact and the amount of gaming operations identified in the Compact, to determine the build-out development potential of tribal gaming facilities. This information was not available for use during the GP2020 road network planning process and would require additional coordination with tribal governments prior to being included in the GP2020 traffic model forecasts. However, the following actions are being taken to address the potential future growth of tribal gaming facilities:

- The traffic impacts from higher levels of growth in tribal gaming will be addressed in the Cumulative Impacts Report of the GP2020 EIR.

- A four-lane designation is proposed for many roads providing primary access to tribal gaming facilities. In addition, a number of two-lane roads retain the right-of-way for a four-lane road in the event that four lanes are needed to accommodate full build-out of tribal gaming facilities within the unincorporated County.